ABSTRACT TEMPLATE – SCIENTIFIC PAPER & SCIENTIFIC EXHIBIT

Construction of a MARS scanner- a 3D spectroscopic x-ray imaging device

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Purpose: To construct a 3D x-ray spectroscopic scanner for biomedical x-ray imaging using the Medipix detector. The scanner, dubbed MARS (Medipix All Resolution System), can be used to image small animal and pathology specimens. Simulations by us, our partners, and industry predict a wide range of clinical applications including vascular and soft tissue imaging. The scanner is designed to enable collection of real data to prove these clinical applications.

Methods and Materials: The scanner uses CERN's (European Organisation for Nuclear Research) energy selective x-ray detector, called Medipix-2. We designed and constructed a gantry and control electronics so that the detector and x-ray tube could be rotated around an object up to 100mm diameter. Software was written to control the scanner and reconstruct the spectroscopic projection data into a 3D volume, using a cone beam filtered back projection.

Results: The scanner successfully takes 3D (volume) images at 43micon resolution, with a user definable number of energy bins of with approximately 3 keV resolution. We have successfully scanned a range of small objects, including several mice.

Conclusion: The scanner is able to provide 3D spectroscopic x-ray images of small animal and pathology specimens. Image processing and display techniques for the novel energy information can now be developed. Clinical applications can be investigated using pathology specimens and mouse models of diseases.

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ABSTRACT TEMPLATE – EDUCATIONAL EXHIBIT

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Learning Objectives: Type text

Background: Type Text

Imaging Findings OR Procedure Details: Type Text

Conclusion: Type Text